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Construction Engineering
Research Laboratory

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Watervliet Arsenal Decision Tree Program for Evaluating Hazardous Spills (SPILL)

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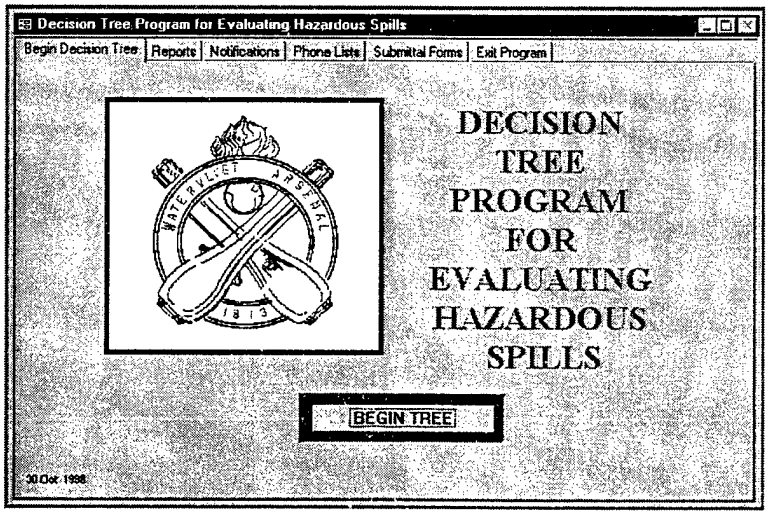

This study devised the Decision Tree Program for Evaluating Hazardous Spills (SPILL), a computer tool designed to allow Army installation personnel to evaluate a material spill on installation property and, based on determining factors, to report the event in a proper and timely fashion to all appropriate authorities. The program accomplishes the determination by presenting the user with a series of "YES" and "NO" questions regarding the spill. On conclusion of the question/answer segment, the program lists instructions and required notifications for the specific type of spill in question. SPILL also contains editable notification and phone lists.

While the SPILL program was created specifically to meet the needs of a single Army installation, it may help any installation that stores, handles, or uses hazardous materials to quickly and correctly evaluate and respond to hazardous materials spills.

Foreword

This study was conducted for Watervliet Arsenal under MIPR No. 8DISCERL19X, "Decision Tree Program for Evaluation Hazardous Spills." The technical monitor was Dr. Dana L. Levy, SIOWV-ISH.

The work was performed by the Facilities Maintenance Branch (CF-F) of the Facilities Division (CF), Construction Engineering Research Laboratory (CERL). The CERL Principal Investigator was Veda D. Scarpetta. Many thanks are owed to Jearldine Northrup, CECER-CN-E, for her valuable contributions as technical advisor to this project. Mark W. Slaughter is Chief, CECER-CF-F, and L. Michael Golish is Chief, CECER-CF. The technical editor was William J. Wolfe, Information Technology Laboratory.

The Director of CERL is Dr. Michael J. O'Connor.

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1 Introduction

Background

The Decision Tree Program for Evaluating Hazardous Spills (SPILL) is a computer tool designed to allow Watervliet Arsenal personnel to evaluate a material spill on installation property and, based on determining factors, to report the event in a proper and timely fashion to all appropriate authorities. The program accomplishes the determination by presenting the user with a series of "YES" and "NO" questions regarding the spill. There are many paths through the program. Not all questions are asked every time, only the ones pertinent to the current set of circumstances. On conclusion of the question/answer segment, the user will be presented with reports that list instructions and required notifications for the specific type of spill in question.

In addition to the decision tree portion of the program, SPILL also contains editable notification and phone lists. The program also provides a facility for printing out the New York State Department of Environmental Conservation Division of Water "REPORT OF NONCOMPLIANCE EVENT" form.

Objective

The objective of this study was to devise an automated approach to help Army installation personnel quickly and correctly evaluate hazardous materials spills, and make required notifications.

Approach

1. Definitions of hazardous materials, and notification requirements for hazardous materials spills were reviewed.
2. A series of Yes/No questions was derived to determine, according to specific determining factors, whether a specific spill involved hazardous material(s), and whether notification(s) were required.
3. The question/answer series was programmed into a user-friendly, menu-driven MS Access data base program.

4. The data base program was also programmed to include editable notification and phone lists so users can update the program to meet current needs.

Scope

While the SPILL program was created specifically to meet the needs of a single Army installation, it may help any installation that stores, handles, or uses hazardous materials to quickly and correctly evaluate and respond to hazardous materials spills.

Mode of Technology Transfer

The SPILL program was sent directly to its sponsoring agency. It is anticipated that the SPILL manual and application will be made available for download from the CERL Internet web page, accessible through the URL:

http://www.cecer.army.mil/

2 System Requirements

The SPILL program was developed using Microsoft® ACCESS© 97. Microsoft ACCESS is a Relational Data Base Management System (RDBMS) with a built-in visual basic programming capability. SPILL requires approximately 6.5 megabytes of disk space as well as at least 12 megabytes of RAM under Windows 95 or 16 megabytes under Windows NT. It is also intended for use with monitors having VGA resolution. If the SPILL program is used with super VGA resolution, it may not fit properly on the computer screen.

3 System Installation

To install the SPILL program to the hard drive on your computer, load the installation CD into your CD drive. Run the SETUP.EXE program from the CD to begin the installation. The default installation directory is C:\spill, but you may change this at setup time (Figure 1). A "Hazardous Spill Decision Tree" item will be added to the Windows Programs menu at the conclusion of the installation process. Click on the SPILL menu item to start the program.

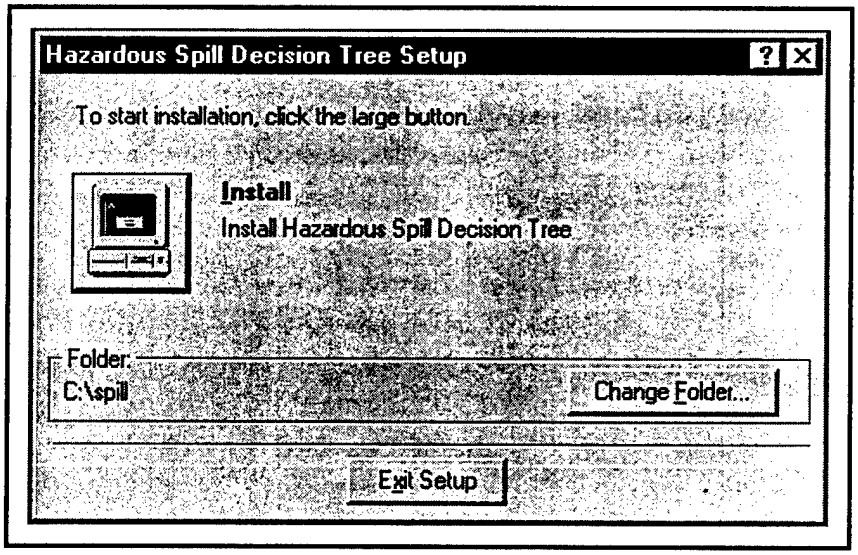


Figure 1. SPILL program setup menu.

4 Overview of Screens

The program interface is segmented into six tabbed screens. The tabs are labeled "Begin Decision Tree," "Reports," "Notifications," "Phone Lists," "Submittal Forms," and "Exit Program." To select a screen, simply left-mouse click on the appropriate tab. The use of each of these six screens will be detailed below. The "Begin Decision Tree" screen (Figure 2) is displayed first.

Begin Decision Tree

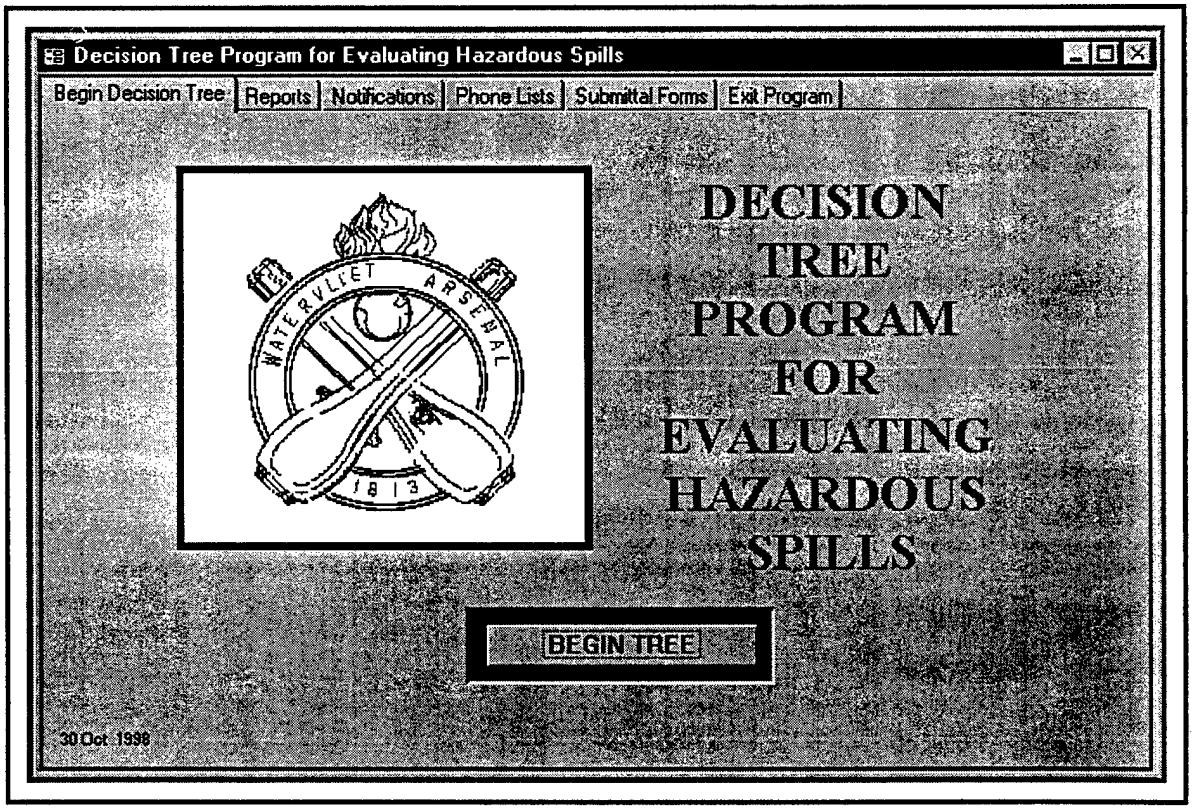


Figure 2. "Begin Decision Tree" screen.

Click the "BEGIN TREE" button to begin the question/answer session. The series of questions are organized into eleven blocks, labeled A, B, C ... through K. (Blocks G, H, and K are currently unavailable, but could be added at a later date.) Depending upon how each question is answered, another question may

follow. Do NOT be concerned if some questions are skipped. Answering YES or NO to particular questions may trigger a NOTIFICATION statement. When the program concludes, the program will create a report listing all the notifications that apply to the specific spill event. The user should follow the instructions in the notifications so all the appropriate authorities will be notified of the situation.

Appendix A to this letter report lists the text of each question in the system. Appendix B gives a "road map" showing how the questions are organized, and the sequence the questions will follow depending on specific YES or NO answers. This list also shows which NOTIFICATIONS the given answers will trigger.

Figure 3 shows a sample question screen. For each question screen, the user must mouse-click the YES or NO button, then click the NEXT SCREEN button. On some screens, there is a PREVIOUS SCREEN button, which can be used to return to the previous screen. A user may back up through screens in the current question block, but may not return to a previous block. The block label appears in the bottom left corner. This screen shows Question #18 in Block C.

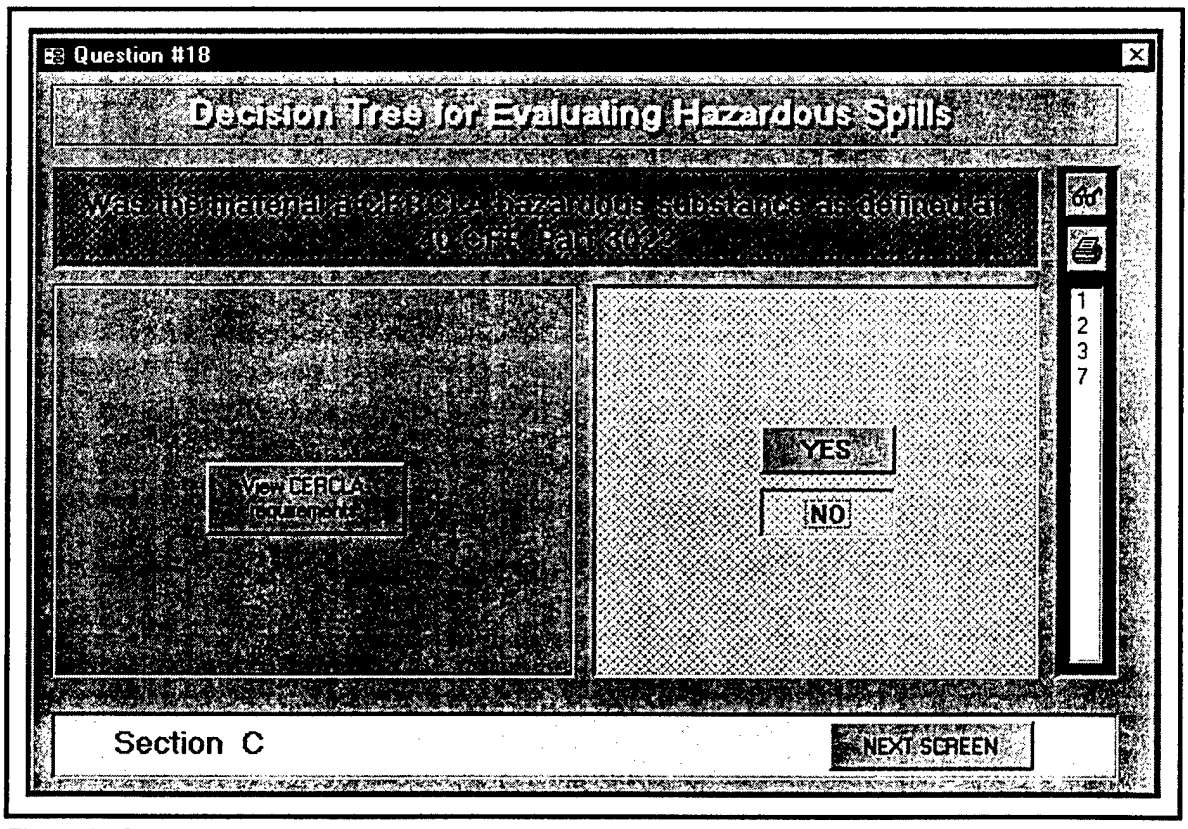


Figure 3. Sample "Yes/No" question screen.

The vertical bar displayed on the right lists the notifications that apply to this spill event. This list may grow depending on how subsequent questions are answered. When the program concludes, all the applicable notifications will be listed in the final report. The user may view one of the notifications at this point by double-clicking on the notification number. For example, double-clicking on the 7 above will display notification #7. The user may click on the "eyeglasses" button to view all the notifications in the list, or click on the "printer" button to print all of the notifications in the list.

Once the user has answered all the questions, the conclusion screen (Figure 4) is displayed. From this screen, the user has three options: (1) to view a list of notifications, (2) to print a list of notifications, and (3) to print an answer trail report. The answer trail report is a record of how each question was answered in the session just concluded.

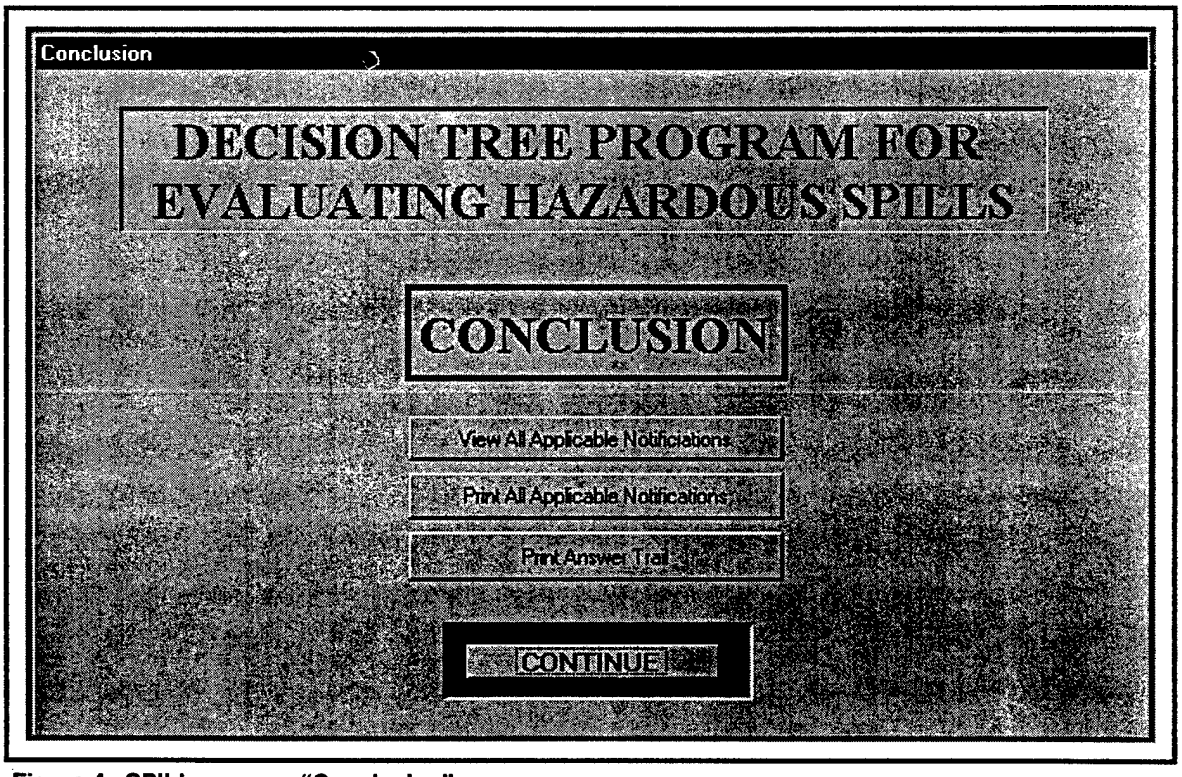


Figure 4. SPILL program "Conclusion" screen.

When the "Print Answer Trail" button is selected, a "Summary Information" screen (Figure 5) appears that allows the user to document and label this spill session. It is recommended that the user complete this form and print the reports at this point. Otherwise, once the program is exited, these results will be lost.

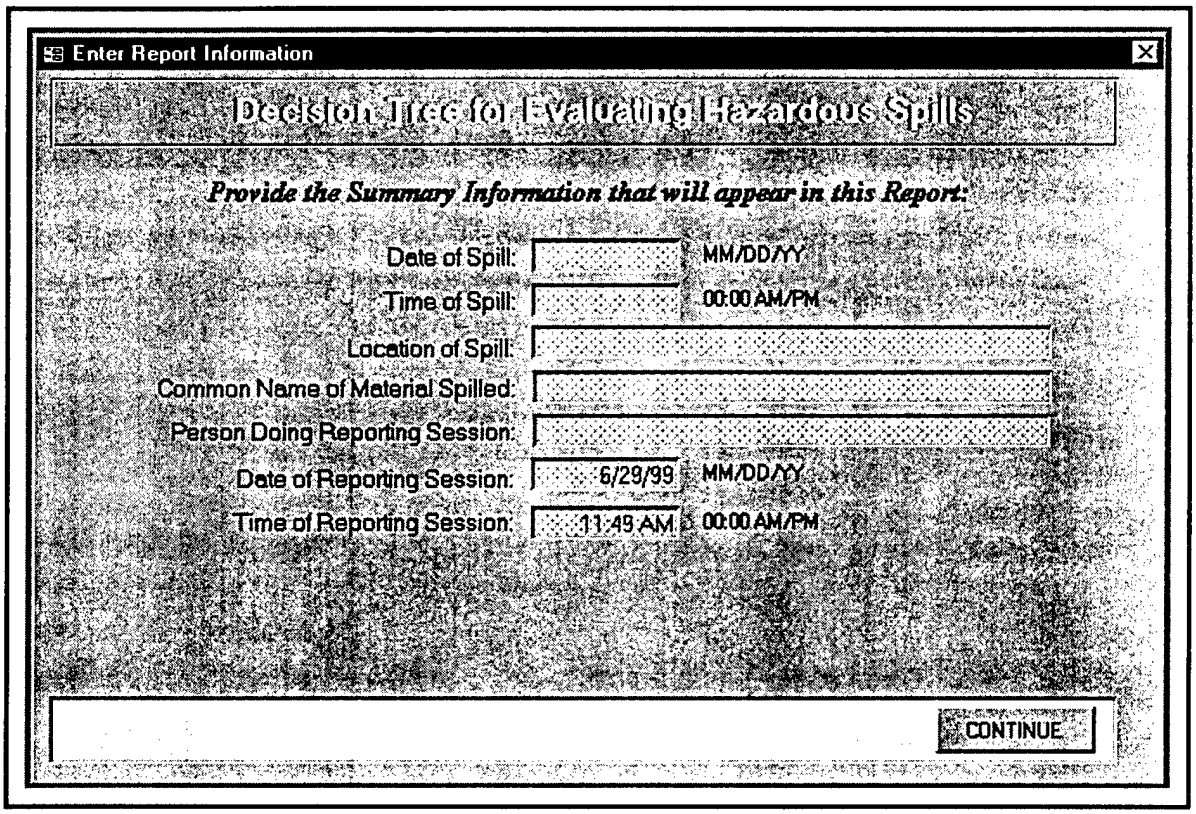


Figure 5. "Summary Information" screen.

Reports

Figure 6 shows the reports screen. This screen is another place from which the concluding reports may be produced. Keep in mind that these reports are available ONLY until the program is exited or until a new question/answer session is begun.

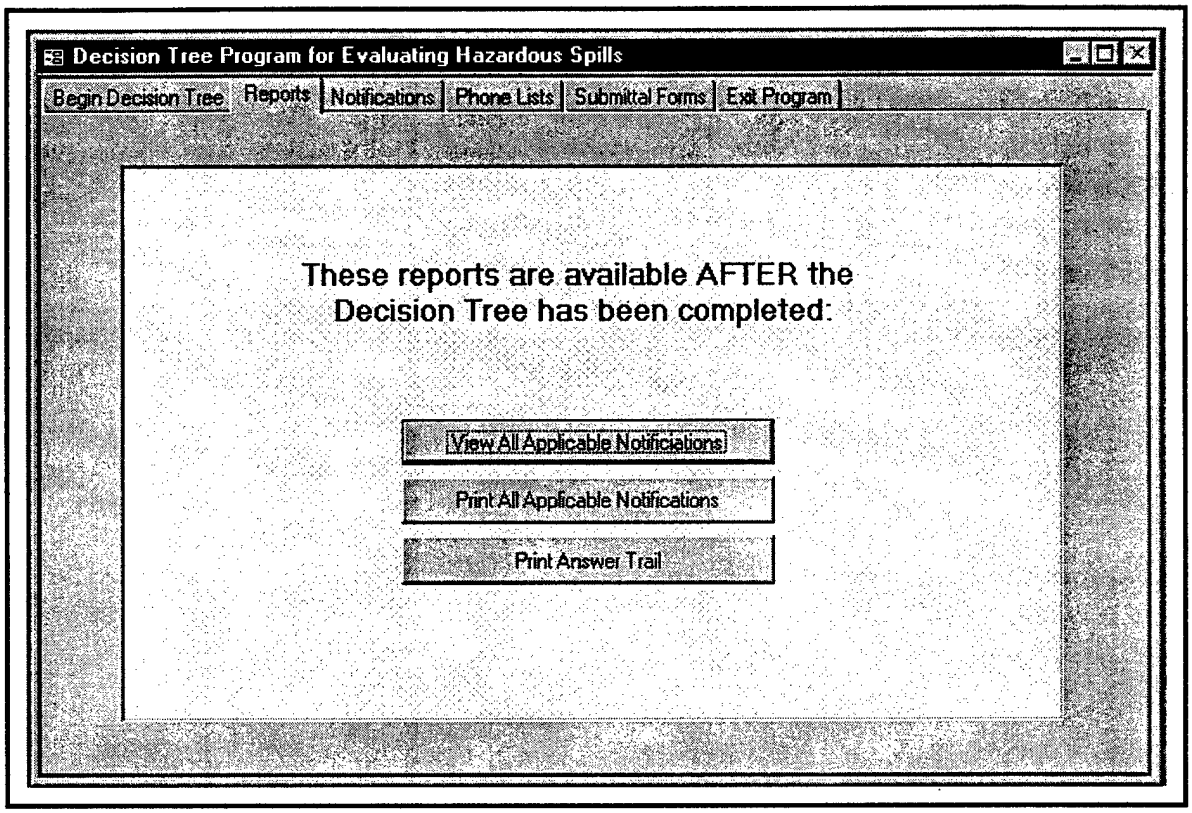


Figure 6. SPILL program "Reports" screen.

A sample notification report is included in Appendix C and a sample answer trail report is included in Appendix D.

Notifications

The "road map" in Appendix B shows how the notifications are programmatically tied to the questions and answers. (For example, answering "Yes" to Question 3 triggers Notification #1.) This link is hard-coded and cannot be easily changed. However, the text of each notification *is* editable. There will be times that phone numbers and names will need to be changed. This notification list is edited by using the NOTIFICATIONS screen (Figure 7).

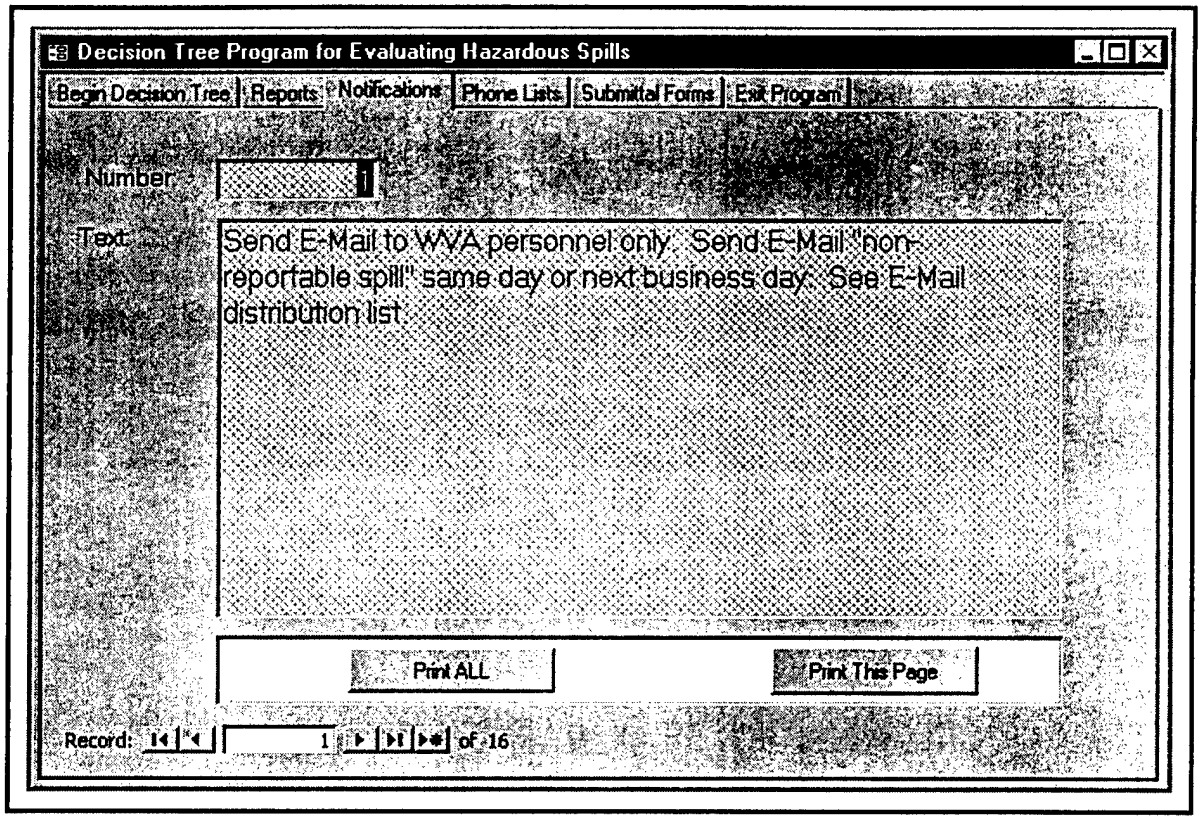


Figure 7. "Notifications" screen.

Each notification is keyed to the NOTIFICATION number. To change the text, simply type over it. Once changed, this new information is saved "permanently" or until it is changed again. The current notification may be printed by clicking the "Print This Page" button. Use the "Print ALL" button to print all notifications in the system.

Phone Lists

The phone list feature is not directly attached to the notifications or to other parts of the program, but is provided as a convenience. The user will want to add all pertinent phone numbers to the list so that they will be readily accessible during a spill situation.

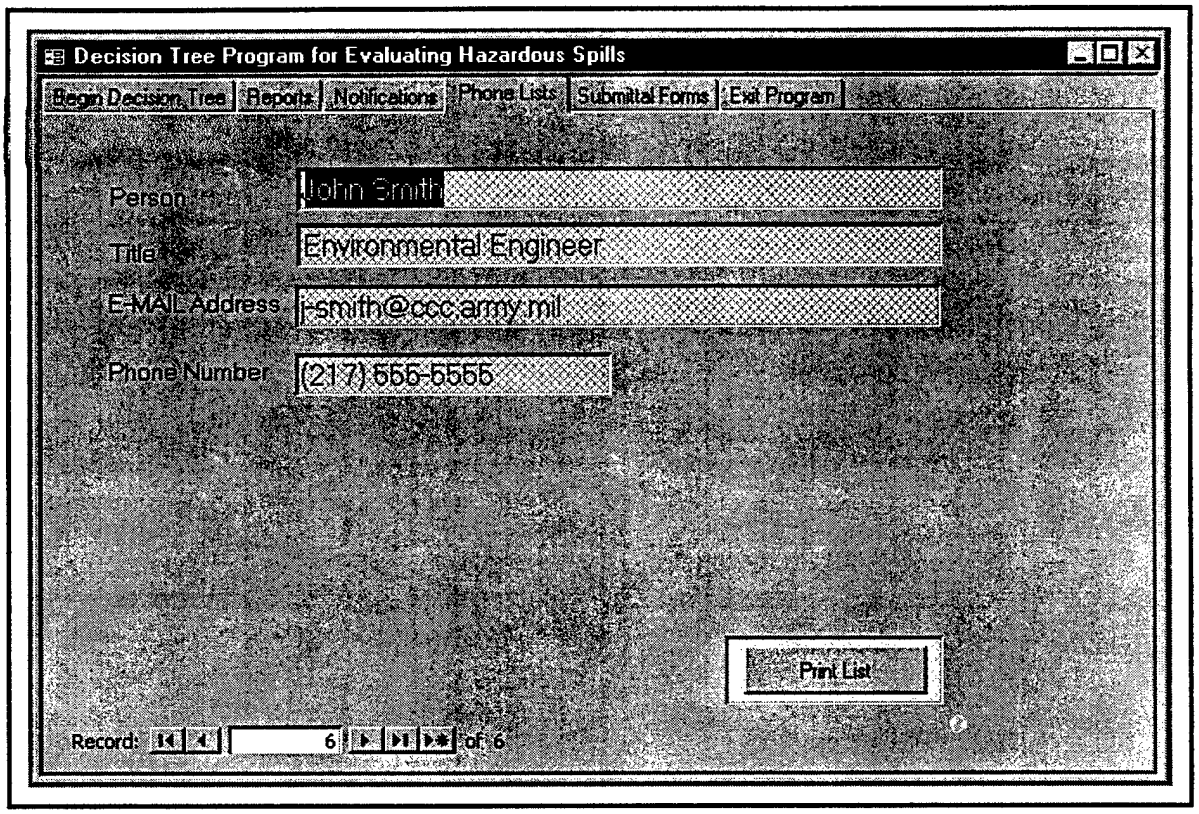


Figure 8. SPILL program phone list record.

To edit a record, simply type over the existing text. It will be saved and remain as such until it is edited again.

To add a new record, mouse click on the  button. A new blank record appears. Type in the information for the new record.

A complete phone "directory" may be printed by using the "Print List" button.

Submittal Forms

On conclusion of the decision tree sequence for a specific spill, one of the notification statements may stipulate that a New York State Department of Environmental Conservation Division of Water "REPORT OF NONCOMPLIANCE EVENT" be submitted. The user may produce a copy of this noncompliance from the submittal forms screen (Figure 9). Appendix E to this letter report contains a copy of this form. The instruction sheet for completing this form may also be printed from this screen. Print either of these items by clicking the appropriate button.

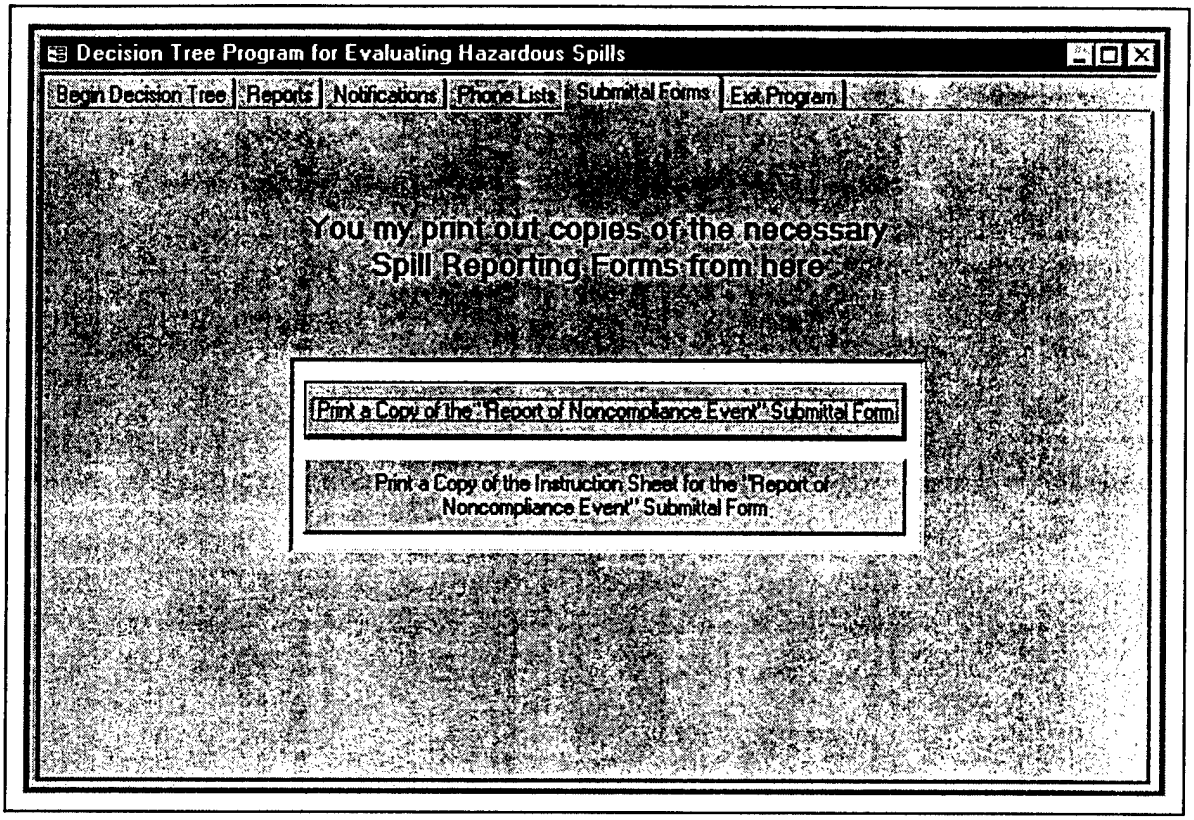


Figure 9. Submittal Forms screen.

Exit Program

The last screen (Figure 10) is used to exit the program. Keep in mind that all SESSION results are lost once the program is exited. However, changes to phone lists or notification lists will be saved for subsequent sessions.

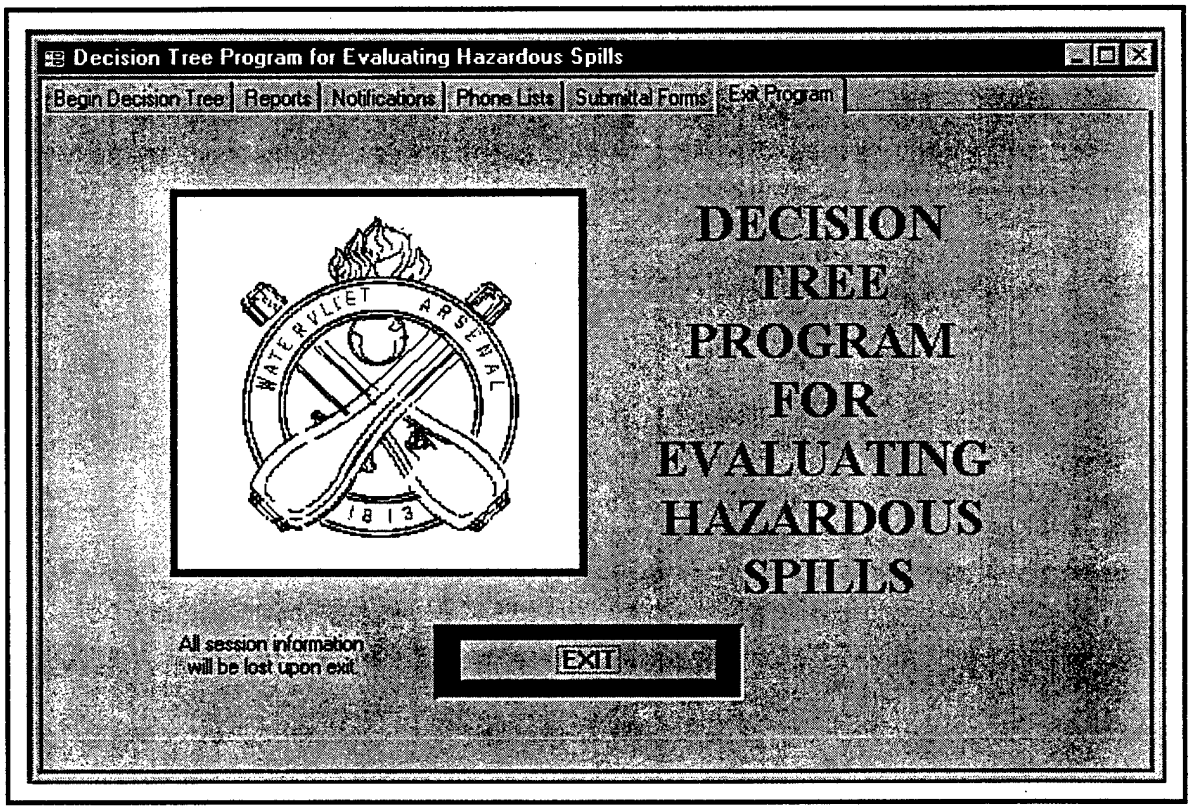


Figure 10. SPILL program Exit screen

5 Conclusion

This study devised an automated approach to help Army installation personnel quickly and correctly evaluate hazardous materials spills, and make required notifications. The Decision Tree Program for Evaluating Hazardous Spills (SPILL) program is a computer tool designed to allow Watervliet Arsenal personnel to evaluate a material spill on installation property and, based on determining factors, to report the event in a proper and timely fashion to all appropriate authorities. While the SPILL program was created specifically to meet the needs of a single Army installation, it may help any installation that stores, handles, or uses hazardous materials to quickly and correctly evaluate and respond to hazardous materials spills.

Appendix A: List of Questions

LIST OF QUESTIONS (sorted by number)

Number	*Section*	*Question*
1	A	Was the material petroleum?
2	A	Was the spill entirely indoors or contained within an impervious secondary containment structure?
3	A	Has the spill been completely cleaned-up within 24 hours?
4	A	Did it enter a storm sewer catchbasin?
5	A	Was the quantity more than 1000 gallons?
6	A	Was the quantity less than 5 gallons?
7	A	Did it reach navigable waters?
8	A	Has there been a prior spill of petroleum which reached navigable waters?
9	A	Did today's spill cause harm; sheen, discoloration or deposits?
10	A	Did today's spill cause harm; sheen, discoloration or deposits?
11	A	Was the spill entirely onto an impervious surface?
12	A	Was the quantity more than 1000 gallons?
13	A	Was the spill completely under control within 2 hours?
14	B	Was the material a hazardous waste?
15	B	Did it exceed the CERCLA reportable quantity?
16	B	Did it enter a storm sewer catchbasin?
17	B	Did it enter a storm sewer catchbasin?
18	C	Was the material a CERCLA hazardous substance as defined at 40 CFR Part 302?

Number	*Section*	*Question*
19	C	Was the spill entirely indoors and/or entirely within a secondary containment structure?
20	C	Has the spill been completely cleaned-up within 24 hours?
21	C	Did it enter a storm sewer catchbasin?
22	C	Did it exceed the CERCLA reportable quantity?
23	C	Did it exceed the CERCLA reportable quantity?
24	D	Was the material an EPCRA "extremely hazardous substance"?
25	D	Was the spill entirely indoors and/or entirely within a secondary containment structure?
26	D	Has the spill been completely cleaned-up within 24 hours?
27	D	Did it enter a storm sewer catchbasin?
28	D	Did it exceed the EHS reportable quantity?
29	D	Does it threaten Rensselaer County?
30	D	Did it exceed the EHS reportable quantity?
31	D	Does it threaten Rensselaer County?
32	E	Was the material a "Clean Waters Act" substance?
33	E	Was the spill entirely indoors and/or entirely within a secondary containment structure?
34	E	Has the spill been completely cleaned-up within 24 hours?
35	E	Did it enter a storm sewer catchbasin?
36	E	Was the material a "Clean Waters Act" substance?
37	E	Was the material a "Clean Waters Act" substance?
38	F	Was the material a NYSDEC chemical bulk storage-regulated chemical?

Number	*Section*	*Question*
39	F	Was the spill entirely indoors and/or entirely within a secondary containment structure?
40	F	Has the spill been completely cleaned-up within 24 hours?
41	F	Did it enter a storm sewer catchbasin?
42	F	Did it exceed the NYSDEC CBS reportable quantity?
43	F	Did it exceed the NYSDEC CBS reportable quantity?
44	I	Was the material PCB?
45	I	Was the spill entirely indoors and/or entirely within a secondary containment structure?
46	I	Has the spill been completely cleaned-up within 24 hours?
47	I	Did it enter a storm sewer catchbasin?
48	I	Was the source concentration known/presumed greater than 50 ppm or unknown?
49	I	Was the source concentration known/presumed greater than 50 ppm or unknown?
50	J	Any other material spilled which has not yet been accounted for in this decision-tree?
51	J	Was the spill entirely indoors and/or entirely within a secondary containment structure?
52	J	Has the spill been completely cleaned-up within 24 hours?
53	J	Did it enter a storm sewer catchbasin?
54	J	Was the source a RCRA SWMU per RCRA consent order?
55	J	Was the source a RCRA SWMU per RCRA consent order?

Appendix B: System Road Map

Section A

QUESTION	if YES	YES, Notifications	if NO	NO, Notifications	FieldName	Previous
question 1	question 2		question 14		answer1	
question 2	question 3		question 4		answer2	question 1
question 3	question 14	1	question 14	2, 3	answer3	question 2
question 4	question 5		question 6		answer4	question 2
question 5	question 14	2, 3, 5, 6, 9	question 7		answer5	question 4
question 6	question 11		question 12		answer6	question 4
question 7	question 8		question 14	2, 3	answer7	question 5
question 8	question 9		question 10		answer8	question 7
question 9	question 14	2, 3, 5, 6, 9	question 14	2, 3, 5, 6	answer9	question 8
question 10	question 14	2, 3, 5, 9	question 14	2, 3, 5	answer10	question 8
question 11	Question 13		question 14	2, 3	answer11	question 6
question 12	question 14	2, 3, 6	question 14	2, 3	answer12	question 6
question 13	question 14	1	question 14	2, 3	answer13	question 11

Section B

QUESTION	If YES	YES Notifications	If NO	NO Notifications	FieldName	Previous
question 14	question 15		question 18		answer14	
question 15	question16		question17		answer15	question 14
question 16	question 18	2, 3, 5, 7, 9	question 18	2, 3, 7, 9	answer16	question 15
question 17	question 18	2, 3, 5, 7	question 18	2, 3, 7	answer17	question 15

Section C

QUESTION	If YES	YES, Notifications	If NO	NO, Notifications	FieldName	Previous
question 18	question 19		question 24		answer18	
question 19	question 20		question 21		answer19	question 18
question 20	question 24	1	question 24	2, 3	answer20	question 19
question 21	question 22		question 23		answer21	question 19
question 22	question 24	2, 3, 5, 9	question 24	2, 3, 5	answer22	question 21
question 23	question 24	2, 3, 9	question 24	2, 3	answer23	question 21

Section D

QUESTION	If YES	YES, Notifications	If NO	NO, Notifications	FieldName	Previous
question 24	question 25		question 32		answer24	
question 25	question 26		question 27		answer25	question 24
question 26	question 32	1	question 32	2, 3	answer26	question 25
question 27	question 28		question 30		answer27	question 25
question 28	question 29		question 32	2, 3, 5	answer28	question 27
question 29	question 32	2, 3, 5, 9, 14, 15, 16	question 32	2, 3, 5, 9, 14, 15	answer29	question 28
question 30	question 31		question 32	2, 3	answer30	question 27
question 31	question 32	2, 3, 9, 14, 15, 16	question 32	2, 3, 9, 14, 15	answer31	question 30

Section E

QUESTION	If YES	YES, Notifications	If NO	NO, Notifications	FieldName	Previous
question 32	question 33		question 38		answer32	
question 33	question 34		question 35		answer33	question 32
question 34	question 38	1	question 38	2, 3	answer34	question 33
question 35	question 36		question 37		answer35	question 33
question 36	question 38	2, 3, 5, 9	question 38	2, 3, 5	answer36	question 35
question 37	question 38	2, 3, 9	question 38	2, 3	answer37	question 35

Section F

QUESTION	If YES	YES, Notifications	If NO	NO, Notifications	FieldName	Previous
question 38	question 39		question 44		answer38	
question 39	question 40		question 41		answer39	question 38
question 40	question 44	1	question 44	2, 3	answer40	question 39
question 41	question 42		question 43		answer41	question 39
question 42	question 44	2, 3, 5, 10	question 44	2, 3, 5	answer42	question 41
question 43	question 44	2, 3, 10	question 44	2, 3	answer43	question 41

Section I

QUESTION	If YES	YES Notifications	If NO	NO Notifications	FieldName	Previous
question 44	question 45		question 50		answer44	
question 45	question 46		question 47		answer45	question 44
question 46	question 50	1	question 50	2, 3	answer46	question 45
question 47	question 48		question 49		answer47	question 45
question 48	question 50	?	question 50	?	answer48	question 47
question 49	question 50	?	question 50	?	answer49	question 47

Section J

QUESTION	If YES	YES, Notifications	If NO	NO, Notifications	FieldName	Previous
question 50	question 51		Conclusion		answer50	
question 51	question 52		question 53		answer51	question 50
question 52	Conclusion	1	Conclusion	2, 3	answer52	question 51
question 53	question 54		question 55		answer53	question 51
question 54	Conclusion	2, 3, 5, 11, 12, 13	Conclusion	2, 3, 5	answer54	question 53
question 55	Conclusion	2, 3, 11, 12, 13	Conclusion	2, 3	answer55	question 53

Appendix C: Sample Notifications Report

NOTIFICATION ACTION REQUIRED:

Notification 1

Send E-Mail to WVA personnel only. Send E-Mail "non-reportable spill" same day or next business day. See E-Mail distribution list.

Notification 2

Call NYSDEC Spill Hotline within 2 hours.

NYSDEL Spill Hotline Phone Number is (518) 457-7362.

Notification 3

Send E-Mail to HQ IOC and WVA personnel. Send E-Mail "Reportable Spill" same day or next business day. See E-Mail distribution list.

On the weekend, if high profile, call IOC duty officer at phone # _____ .

Notification 5

Call NYSDEC Region 4 Regional Water Engineer (ATTN: Mr. Fred Sievers, P.E.) at phone number (518) 357-2045. Ask if 5-day written letter is required or waived per NYSDEC discretion encoded at _____. Make written notation of decision in spill log book. If NYSDEC requires 5-day written letter, perform notification #4. Alternate NYSDEC POCs are regional director or regional engineer or regional director.

Notification 7

Before "Re-commence Hazardous Waste Activities" call NYSDEC region 4 Regional Hazardous Waste Engineer (attn: Mr. Clif Van Guilder, P.E. at phone number, (518) 357-2045 per 6 NYCRR 373-3.4 (g)(10). Include statements per 6 NYCRR 373-3.4 (g)(9). Alternate NYSDEC POC assistant regional director or regional engineer or regional director. Ask if 15-day written letter required or waived per NYSDEC discretion encoded at _____. Make written notation of decision in spill log book. If NYSDEC require 15-day written letter, perform notification #8.

Notification 9

Call the National Response Center (NRC) operated by the U.S. Coast Guard at phone number, _____, at the earliest convenience after termination of emergency response actions, or sooner if requesting assistance with emergency response actions.

Appendix D: Sample Answer Trail Report

Hazardous Spill Decision Tree - Answer Trail

Spilled: gasoline *Spill Date:* 6/29/99

At: Building 1423 *Spill Time:* 8:00:00 AM

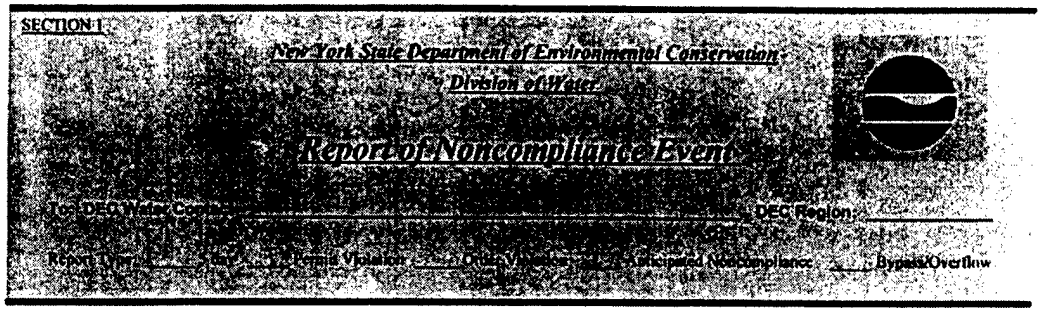
Reporting Session Prepared By: T. Jones *On:* 6/29/99 2:44:36 PM

Section	*Number*	*Question*	*Answer Given*
A	1	Was the material petroleum?	Yes
A	2	Was the spill entirely indoors or contained within an impervious secondary containment structure?	Yes
A	3	Has the spill been completely cleaned-up within 24 hours?	No
B	14	Was the material a hazardous waste?	Yes
B	15	Did it exceed the CERCLA reportable quantity?	Yes
B	16	Did it enter a storm sewer catchbasin?	No
C	18	Was the material a CERCLA hazardous substance as defined at 40 CFR Part 302?	Yes
C	19	Was the spill entirely indoors and/or entirely within a secondary containment structure?	No
C	21	Did it enter a storm sewer catchbasin?	Yes
C	22	Did it exceed the CERCLA reportable quantity?	Yes
D	24	Was the material an EPCRA "extremely hazardous substance"?	No
E	32	Was the material a "Clean Waters Act" substance?	Yes
E	33	Was the spill entirely indoors and/or entirely within a secondary containment structure?	Yes
E	34	Has the spill been completely cleaned-up within 24 hours?	Yes

Spill ID: Gasoline Spill
At: Building 1423
Reporting Session Prepared By: T. Jones
Spill Date: 6/29/99
Spill Time: 8:00:00 AM
On: 6/29/99 2:44:36 PM

Section	*Number*	*Question*	*Answer Given*
F	38	Was the material a NYSDEC chemical bulk storage-regulated chemical?	Yes
F	39	Was the spill entirely indoors and/or entirely within a secondary containment structure?	No
F	41	Did it enter a storm sewer catchbasin?	Yes
F	42	Did it exceed the NYSDEC CBS reportable quantity?	No
I	44	Was the material PCB?	Yes
I	45	Was the spill entirely indoors and/or entirely within a secondary containment structure?	No
I	47	Did it enter a storm sewer catchbasin?	Yes
I	48	Was the source concentration known/presumed greater than 50 ppm or unknown?	Yes
J	50	Any other material spilled which has not yet been accounted for in this decision-tree?	Yes
J	51	Was the spill entirely indoors and/or entirely within a secondary containment structure?	No
J	53	Did it enter a storm sewer catchbasin?	Yes
J	54	Was the source a RCRA SWMU per RCRA consent order?	No

Appendix E: Report of Noncompliance Event Form



SECTION 2

SPDES #: NY-_____ Facility: _____

Date of noncompliance: ____/____/____ Location (Outfall, Treatment Unit, or Pump Station): _____

Description of noncompliance(s) and cause(s):

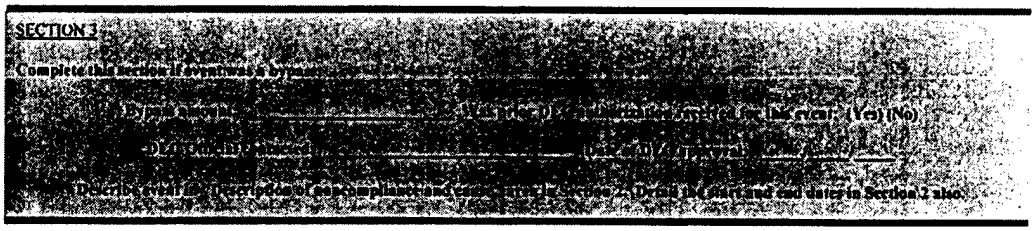
Has event ceased? (Yes) (No) If so, when?_____ Was event due to plant upset? (Yes) (No) SPDES limits violated? (Yes) (No)

Start date, time of event: ____/____/____, ____:____ (AM) (PM) End date, time of event: ____/____/____, ____:____ (AM) (PM)

Date, time oral notification made to DEC? : ____/____/____, ____:____ (AM) (PM) DEC Official contacted: _____

Immediate corrective actions:

Preventive (long term) corrective actions:



SECTION 4

Facility Representative: _____ Title: _____ Date: ____/____/____

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13. ABSTRACT *(Maximum 200 words)*

This study devised the Decision Tree Program for Evaluating Hazardous Spills (SPILL), a computer tool designed to allow Army installation personnel to evaluate a material spill on installation property and, based on determining factors, to report the event in a proper and timely fashion to all appropriate authorities. The program accomplishes the determination by presenting the user with a series of "YES" and "NO" questions regarding the spill. On conclusion of the question/answer segment, the program lists instructions and required notifications for the specific type of spill in question. SPILL also contains editable notification and phone lists.

While the SPILL program was created specifically to meet the needs of a single Army installation, it may help any installation that stores, handles, or uses hazardous materials to quickly and correctly evaluate and respond to hazardous materials spills.

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